IN THE CLAIMS:

1. (Cancelled)

2. (Currently amended) The ~~material~~ method of claim ~~1~~ 17 wherein said ~~semiconductor comprises~~nanoparticles comprise at least one of the following: C, Si, Ge, CuCl, CuBr, CuI, AgCl, AgBr, AgI, Ag_2S, CaO, MgO, ZnO, $Mg_xZn_{1-x}O$, ZnS, HgS, ZnSe, CdS, CdSe, CdTe, HgTe, PbS, BN, AlN, GaN, ~~,~~$Al_xGa_{1-x}N$, GaP GaAs, GaSb, InP, InAs, $In_xGa_{1-x}As$, SiC, $Si_{1-x}Ge_x$, Si_3N_4, ZrN, CaF_2, YF_3, Al_2O_3, SiO_2, TiO_2, Cu_2O, Zr_2O_3, ZrO_2, SnO_2, YSi_2, $GaInP_2$, Cd_3P_2, Fe_2S, Cu_2S, $CuIn_2S_2$, MoS_2, In_2S_3, Bi_2S_3, $CuIn_2Se_2$, In_2Se_3, HgI_2, PbI_2 and their various isomers and alloys.

3. (Currently amended) The ~~material~~ method of claim ~~1~~ 17 wherein said nano-particles are in spherical, cubical, rod-like, tetragonal, single or multi-wall nano-tube or other nano-scale geometric shapes.

4. (Currently amended) The ~~material~~ method of claim ~~1~~ 17 wherein said nano-particles are immersed in polymer matrix or other chemicals.

5. (Currently amended) The ~~materials~~ method of claim ~~1~~ 17 wherein the nano-particles are doped with other elements.

6. (Currently amended) The ~~materials~~ method of claim ~~1~~ 17 wherein the nano-particles are coated with other semiconductors or chemicals.

7. (Currently amended) ~~A~~ The method of claim 17 further including using ~~reversible~~ said ~~photo~~-bleachable ~~material~~ enhancement layer to create images or patterns with higher resolution than the diffraction limit allows.

8. (Currently amended) ~~A method of adjusting the relaxation time of the reversible photo-bleachable material comprising a mechanism to separate~~The method

of claim 17 further including separating ~~at least part of the~~ photo-generated electrons and holes in said nanoparticles.

9. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 ~~wherein said mechanism comprises~~ further including providing carrier accepting surface states in said nano-particles.

10. (Currently amended) ~~A~~ The method of claim ~~8~~17 ~~wherein said mechanism comprises~~further including providing chemical surfactant at the surface of said nano-particles.

11. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 ~~wherein said mechanism~~ wherein said nanoparticles comprise ~~comprises providing two~~plural types of nano-particles with different band-gaps.

12. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 ~~wherein said mechanism comprises~~wherein said nanoparticles have a bandgap, and the method further includes providing, at the surface of said nano-particles, a semiconductor coating ~~of another semiconductor~~ with a band-gap different from the band-gap of said nanoparticles ~~at the surface of said nano-particles~~.

13. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 wherein said ~~mechanism comprises providing~~nano-particles include a n-type nano-particle within a p-type polymer matrix.

14. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 wherein ~~said mechanism~~said nanoparticles comprises ~~providing~~ at least one p-type nano-particle within an n-type polymer matrix.

15. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 ~~wherein said mechanism comprises providing~~ wherein said nanoparticles comprise n-type nano-particle or p-type nano-particles in a non-doped polymer matrix.

16. (Currently amended) ~~A~~ The method of claim ~~8~~ 17 ~~wherein said mechanism comprises~~further including inducing Auger recombination of multiple electron and hole pairs in said nano-particles.

17. (Currently amended) A method of exposing a ~~substrate~~ semiconductor wafer having a photoresist thereon, said method comprising:

providing ~~R-CEL~~a contrast enhancement layer ~~based on~~comprising a reversible photo bleachable material ~~on said substrate~~including nanoparticles; ~~and~~

illuminating said photoresist with at least one light pattern~~;~~,

~~said R-CEL~~ at least in part bleaching said contrast enhancement layer ~~bleaches~~ in response to said illuminating; and

changing the solubility of said photoresist at least in part in response to said bleaching.

18. (Currently amended) The method of claim 17 wherein said providing comprises applying a reversible contrast enhancement layer (R-CEL) ~~layer~~ including nano-particles on said photoresist, and said illuminating includes passing incident light through said nano-particle layer before it reaches at least part of said photoresist.

19. (Original) The method of claim 17 wherein said illuminating comprises providing multiple exposures separated in time.

20. (Original) The method of claim 19 further including allowing said R-CEL to relax between at least some of said multiple exposures.

21. (Original) The method of claim 17 wherein said illuminating comprises providing multiple different exposure patterns separated in position on said substrate.

22. (Original) The method of claim 21 further including allowing said nano-particles to relax between at least some of said multiple exposures.

23. (Original) The method of claim 17 wherein said illuminating step comprises using a programmable mask.

24. (Original) The method of claim 23 further including reprogramming said programmable mask to provide at least first and second different exposure patterns, and allowing said nano-particles to at least partially relax after exposure with said first pattern and before exposure with said second pattern.

25. (Original) The method of claim 17 wherein said illuminating step comprises using multiple fixed masks.

26. (Original) The method of claim 17 wherein said exposing process is carried out in liquid-immersion or solid-immersion.

27. (Original) The method of claim 17 wherein said providing mechanism includes spinning, spraying, rinsing, dipping, precipitation, evaporation and other thin-film deposit mechanisms.

28. (Original) The ~~system~~ method of claim 17 wherein said reversible photo bleachable material comprise plural different types of nano-particles.

29. (Original) The ~~system~~ method of claim 17 wherein said reversible photo bleachable material comprise multiple layers containing nano-particles.

30. (Cancelled).

31. (Cancelled).

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled).

36. (New) The method of claim 17 further including further processing said photoresist to at least in part define at least one structure on said semiconductor wafer.

37. (New) The method of claim 17 further including reversing said bleaching of said contrast enhancement layer.

38. (New) The method of claim 17 further including tuning the absorption edge of said nanoparticles by specifying the size of said nanoparticles.

39. (New) The method of claim 17 wherein said illuminating comprises illuminating said layer with light having a wavelength of 365 nm or shorter.

40. (New) The method of claim 17 wherein said illuminating comprises illuminating said layer with light having a wavelength of 193 nm.

41. (New) The method of claim 17 wherein said illuminating comprises illuminating said layer with light having a wavelength of 248 nm.

42. (New) The method of claim 17 wherein said illuminating comprises illuminating said layer with light having a wavelength of 157 nm.

43. (New) The method of claim 17 further including using said nanoparticles to resolve light distribution with high spatial frequency.

44. (New) The method of claim 17 wherein said nanoparticles comprise semiconductor nanoparticles.

45. (New) The method of claim 17 wherein said nanoparticles include Aluminum Nitride nanoparticles.

46. (New) The method of claim 17 wherein said nanoparticles include Aluminum Nitride alloys.

47. (New) The method of claim 17 wherein said nanoparticles include Aluminum Nitride isomers.

48. (New) The method of claim 17 wherein said nanoparticles have electronic structures exhibiting a band-gap.